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# Main Currents

IN MODERN THOUGHT

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## PERSPECTIVE ON OUR TIMES & OURSELVES

## Editorial Summary

World settlement on what might be called anthropological principles is getting to be more and more conceivable. (We use the term anthropology as the over-all science of man that is yet to take shape.) Only some such state of mind provides the attitude which will hasten the end of the war and construct a sane world, to supplant the lunacy that has prevailed in the western world for the last thirty years. The signs of reason are beginning to be seen in the many writers and speakers who have turned their backs once and for all upon a punitive peace -- such a peace being of course the natural concept of the backward mind, which thinks that history began when the Versailles Treaty was signed. Our unphilosophical system of education, which narrows the mind down out of space-time into some particular instant that suits the prejudices of the person, is of course responsible for this kind of thinking.

Among the incidents which illustrate the wider and enlightened view we note David Lawrence, writing in The United States News of June 26, 1942. There he speaks of the need to get a running start in the Present so that the Past, which we cannot change, at least shall not be repeated. He presses hard upon the idea that the post-war world of the Future will be shaped by the Past, as usual, unless we take such a good start in the Present. "The basic error of isolationism is selfishness." "Diplomacy rules by cynicism, not spiritual values." "Men of culture shirked duty to the masses." Such are Mr. Lawrence's basic propositions.

Before we can count on guidance by men of culture however, we have to investigate the contemporary state of culture, to see whether it has achieved what is required to give guidance to the masses. For the culture of Victorianism lightly overlaid with trial-and-error notions derived from the impact of changes in this century, does not constitute a solid structure in which the leaders of our times can invite populations to find shelter. Yet here and there indications of awakening to the requirements, and efforts to fill them, appear.

Last year Julian Huxley discussed in his own way the crucial issue of man's place in Nature (Man Stands Alone, Harper and Brothers, N.Y., 1941, 297 pages, \$2.75, published in England as The Uniqueness of Man.) Here a biologist empha-

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sized the capacity of man for social outlook as a conscious achievement. Though naturally, because of the author's background, the theme was eugenics, climate, race concepts and the like, there was also discussion of scientific humanism and the place of religion, and attention was focussed upon man as man, not man as slightly made-over animal. Again, Rutgers University Press has just published a book by Karl Compton, Robert Trullinger and Vannevar Bush, (Scientists Face the World of 1942), in which three distinguished men discuss the future in terms of ordinary physical science engineering, agricultural engineering, and biological engineering. There are of course no real departments of engineering corresponding to the last two. The terms have some thing to do with the future, which gives the volume point, and sets it just enough off the beaten path to be hopeful.

The older backward looking world on the other hand is symbolized by the meeting of the American Chemical Society in Buffalo, September 7th, 1942. On this occasion speakers repeated the usual confidences about salvation through more products---air conditioned automobiles, new fertilizers, hosiery made out of coal, air and water, magnesium utensils, and so on all of which is old stuff, and by itself means only more trouble. Peace-world planning which does not include new views along with new plastics is quite out. The question is therefore pertinent: How large a view can we take of our times, and where shall we establish ourselves in space-time to see our situation in perspective? Hence the value of anthropology----still in the ideal sense be it understood, not merely as of today---a science which sweeps together psychology, biology and much from the physical sciences such as meteorology, geology and the like. We see this tendency in such writers in anthropology as Margaret Mead. The developments in this subject however have still a long way to go before they display the required comprehensiveness; and most of all we need a few landmarks set up.

Let us take, for example, the question of geological epochs. It is clear that the present geologic age, which was ushered in by the great Laramide (Alpine) Revolution, is as much devoted to a natural specialty-man-as previous ages were to expressing animal and plant, and before that mineral life. How can any anthropologist, in the face of this broad and incontestible fact, not search for purpose and plan in the appearance and distribution of man? It is true that, as yet, no adequate sense of underlying order is apparent in anthropology and caution is excellent and necessary for science. But the implications of great generalizations in one science have at least to be seen and acknowledged from time to time in all other sciences. It is this cross-webbing that strengthens the fabric of all thought.

Lately a popular journal provided this little map by which we can see, from the vantage ground above the north pole, how the Axis strategy is intended to bring



POLAR VIEW OF  
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the Japanese in touch with the Germans and Italians via India. Discussion of this map was illuminating. The feeling required to imagine one's self above the pole is lacking in many of us. We have been conditioned into time-space at the place and point where we live. To Americans Japan is in the West and Germany in the East. When we look at such a polar map we realise that, if Russia had been driven into the alliance with Japan, or is later so driven by maniacal doings of the intransigents, then our enemies will not be separate entities in East and West; they will be a solid block of nations occupying the vast bulk of the polar region in the old world, and perfectly capable of moving down southward upon the rest of the globe year after year, like some human ice age.

Only the very rarest of thinkers in anthropology have inquired afresh into the whole question of origins in this global sense. When anthropology was younger and more hopeful in some ways, and had fewer facts and more opportunity for intuitive generalisations, such global concepts were more common. This was in the last century. They have been lost sight of today, more's the pity. In 1885 Dr. William Warren, then President of Boston University, published a book called *Paradise Found* (Houghton, Mifflin, Boston, 505 pages), in which he discussed the polar origin of all life. There is a remarkable book too by the great Indian Nationalist, B. G. Tilak, *Orion: The Aryan Home in the Vedas* which shows that the Vedic astronomy requires the acceptance of a polar origin for that race. This is verily the old Greek Hyperborean tradition.

Naturally in truly ancient times the world's surface was not peopled with continents of the present shapes and placements. Here comes in the proposal of Haeckel of a vast continent which once stretched from Madagascar to the eastward, including perhaps the Solomons. This he called Lemuria, in reference to the pre-anthropoid creature, the lemur, which occurs on Madagascar. The idea has been strengthened as data has come along, but a new term was coined, Gondwana Land, in reference to India's connection with that epoch, and by the coming of a new word the old concept was lost. In such great ideas, however, even if but working ideas, is to be found the cure for this factual confusion of our times, when we cannot see the woods for the trees, and generalisations within a given science (which seem so safe) do service for over-all philosophy.

They were quaint days, as we see them now, when for example a clerical president of a school encouraging science had to respect the new facts - as Dr. Warren wholeheartedly did - yet somehow try to salvage spiritual, indeed religious and even credal notions. These men had not then the advantages we have today. To them it was an oncoming tide of crass materialism - the tide we today see receding rapidly before electronic physics and relativity idealism. Defenseless as they seemed, they had at least some small hopes of retaining a view of the whole, which hopes the two or three subsequent generations lost; but these can now be recovered by us with the full sanction of the best in science.

It is in this over-all atmosphere of true anthropology-to-come that we may find the hope for a real settlement of world affairs. This will require of us adjustments as revolutionary to our ethical habits as the polar view of the globe is to our intellectual habits. And here is where the difficulty really lies. In world settlement that is to endure, the place accorded to other races and cultures must be wholly fair and adequate, and generously admitted. Isolationism is indeed a form of selfishness, and cartels and competition among great international automobile, electrical refrigeration and other supply companies and basic materials groups, are part of a dying order.

A vast bill is about to be rendered to Europe for its treatment of the world since the time of awakening to trans-oceanic continents. In a current book by Charles Morrow Wilson (*Ambassadors in White*, Holt, New York, 1942) the author quotes Dr. George Cheever Shattuck of Harvard Medical Faculty, who says: "One can say with certainty or a high degree of probability, that nearly all the more deadly diseases known in the New World since its discovery by Columbus, have been imported from the Old World within historic times. This is probably true, also, of the minor epidemic diseases and of many other infectious diseases as well." We look back on the exterminating greed of the conquerors as deeds of ignorant men, and look upon ourselves as wiser men. But the recent history of our relations to Japan and to China and to India will be judged with the same harshness, quite properly, by generations to come. And the only way to get out of this vicious continuum of historical parasitism is to get above the world and look down dispassionately. In J. B. Condliffe's new book, (*Agenda for a Postwar World*, Norton,



New York, 1942) he maintains that after the war the Soviet ideas will probably spread into Germany, perhaps into western - most Europe. He thinks this is the only way privilege can be broken up. Dr. Conliffe is professor of Economics at the University of California, the author of *The Reconstruction of World Trade*, and a collaborator on the staffs of the League of Nations, the London School of Economics, the International Chamber of Commerce and the like. He is thus certainly a realist.

Why do experienced men see the coming of such profound changes? Because the man with world-wide experience, a freed imagination, and a truly impartial view of things cannot but see that mankind as a whole, in space and time, is an organism that, in time, the effects of the past cannot be put away forever, and now is the day of world-wide settlement; that, in space, the very instruments of technology which made the world exploitable, make it small enough so that at last the effects of forces released in any one place are felt eventually as a backwash in the place of their origin. F.K.

#### THE DISTRIBUTION OF NATURAL RESOURCES

#### Is It Equitable?

Harvard University's professor of geology, Dr. Kirtley F. Mather, is all for the planetary exploitation of resources, but he punctured the "have" and "have not" theory in an American Philosophical Society address this summer. "Every continent displays almost the entire gamut of possible geologic structures and therefore may be expected to contain extensive deposits of almost every kind of mineral resource useful today or likely to be useful in the future," says Dr. Mather after surveying the rocks of the world.

The sensational announcement a few days ago of crude petroleum gushing from the earth in England makes Dr. Mather's assertion especially arresting, and goes far to prove that if this country alone has pumped up more than two-thirds of the world's petroleum it is because we have been more successful in our prospecting and production methods than other nations. According to Dr. Mather, "There is no chance that a century ago two-thirds of the world's supply of petroleum was concentrated beneath the surface of the United States." In his opinion every continent, with the exception of Australia, probably contains petroleum reserves proportionate to the entire total of the world's supply.

Similarly, it does not follow that because Continental Europe, the United States, Great Britain and Russia have produced over 80 per cent of the world's steel the rest of the world contains only 20 per cent of the iron ore from which steel is made. We must conclude that the nations that have made the most of their iron ores have been technically most advanced. As a matter of fact, very little is known about deposits of iron ore in Asia, Africa, Australia and South America. In other words, the earth "provides equality of opportunity" and "it is man that differs in responding to opportunity."

(N. Y. TIMES, August 2, 1942: SCIENCE, 96, 125-7. August 7, 1942.)

Incidents of sabotage, train wrecks, etc. while indicative of rising underground opposition to the Nazi regime, will not by themselves be a major factor in winning the war. What is needed is the whole hearted identification with our cause by the people of the conquered countries. However, if some of our own allies are a little suspicious of our good faith we can hardly expect these people, who have seen too much of our imperialism in action, to put their faith in mere words and "assertions of our good intentions as victors." This being a war of ideas, the value of an attack on the psychological front should be recognized, for if the people of Italy and Germany can be convinced that our victory will be theirs, their morale will collapse.

In Europe today millions are dying from starvation, typhus, and the diseases of malnutrition. The food blockade hits not Germany but her victims and "builds up a legacy of warped personalities to defeat the very purposes of our victory. Hunger may have helped win the last war, but far more surely it helped lose the peace and bring on the present war." While some military advantage may accrue, in continuing the blockade we are pursuing a defensive strategy.

Aside from the long range economic and political planning for a federated Europe, the most effective offensive strategy could be instituted by giving immediate relief wherever possible as evidence of our good faith. Spain and Portugal, while under Axis influence, are nevertheless neutral and are badly in need of food and economic assistance. Hitler and Franco would hardly dare prevent the arrival of a half-dozen ship-loads of food and supplies. While some insignificant aid might fall indirectly to Germany through such action, the psychological effect throughout Europe would be tremendous. The same could be done for Greece where the man-made famine is appalling. The International Red Cross or an organization of neutrals could act as organs for this work.

Although the League of Nations failed as an instrument to prevent war it was successful in some of its less ambitious functions, as in the fields of health and welfare. Nominally many neutrals and belligerents are still members. Why could it not now function as a humanitarian agency as proof that nations can work together? If it offered the services of its experts in combating the epidemics now raging in Europe new life and hope would spring forth. Germany might make impossible terms for the sending of necessary supplies even on neutral ships; our own military leaders might object to a scheme which would divert food and medical supplies to Europe, with the possibility of relieving even the German people; there is the possibility which would have to be guarded against that supplies intended for civilian use might be diverted to the military. However, in this war, which is no ordinary war, such daring methods would carry home the reality of our proclaimed war aims--"freedom from want, everywhere in the world." This war will have been fought in vain if it "leaves nothing but hatred and destruction and anarchy behind it." Against an offensive such as this the Nazis could find no defense. (Editorial in COMMON SENSE, July, 1942) G.B.

#### A BI-ANNUAL OF VALUE

The 1942 Fall-Winter issue of Twice-a-Year continued its usual high standard. Its Civil Rights section, though briefer than usual, is nevertheless a valuable record. We might, however, have expected more concerning America's entry into the world melee. There is it is true an interesting account of what's in the American mind, June-December 1941, by Victor Riesel, pp. 288-298, which ends: "If 1941 has shown anything at all, it has shown that America at last has a Government which at least makes a fetish of professing to be for freedom and tolerance. The problem: do the people mean what the Government says....?" A good piece! (TWICE-A-YEAR; Ed. by Dorothy Norman and Mary Lescaze, VIII & IX, 1942, 357 pages.)

A writer in *Nature* (March 8, 1941, p. 289) advances a profound idea by saying, "The immense and awe-inspiring knowledge of the external world which we now possess and which continues to grow at an almost incredible rate, is indeed a matter of the deepest concern. What does it all mean? Is it a discovery of unalterable fact, or a creation which our reason can transform, as experience grows? How comes it that by taking thought in a particular way, unknown to the ancients, we can add unlimited cubits to our stature and determine the course of the world's history? What exactly are we doing, and what are the potentialities of the ideas to which we are led, when we set reason to operate on experience in the manner which has yielded the bulk of the empirical knowledge which is ours today? The man of science, immersed in the process itself, rarely has the time or the aptitude to ponder these questions. He may realize their importance but it is his chief function to produce the knowledge, not to assess it or discover its nature. For that we must look to the philosopher, to the man trained in the processes of accurate logic and versed in the history of human thought. On the philosopher, in the modern sense of the word, rests a great responsibility, perhaps the most urgent responsibility in the world today, that of laying bare the foundations of empirical knowledge, so that we may use it with foresight instead of a blind understanding."

While not in absolute agreement this is supplemented by much in an article of Milton B. Singer's (*The Humanist*, Autumn, 1941) surveying the Unity of Science Movement. We quote: "It is perfectly certain that the men and women who do the work of the world, and who must assume the responsibility of realizing the order we desire, will absolutely refuse to pay the slightest attention to any 'thought-content of a universal culture.' And it is equally certain that if they tried to do so, they would be unable to understand the meaning of the phrase, assuming that it has a meaning in reference to the problems they have on their hands to solve. No; much as men need a philosophy of life, they will not, indeed cannot, take it from philosophers who regard themselves as chosen people. F.H. Bradley was right: 'There is no sin, however prone to it the philosopher may be, which philosophy can justify so little as spiritual pride.' A slow but steady river of thought and effort, however, has been taking strength from many sources to build an empirical synthesis of the scientific outlook. The conjectures are remarkable. In their pragmatism, William James, John Dewey and George Herbert Mead gave the English-speaking world a long start toward an empirical philosophy. .... A Concrete picture of the scope of this movement and of how it is building a scientific synthesis may be gathered from the Sixth International Congress for the Unity of Science, held at the University of Chicago from September 1 to 6. (1941) \*Despite wartime transportation difficulties, men or papers came to this Congress from France, England, Norway, Poland, and Holland. The international character of the movement, which is at the same time entirely non-political, sets the essential kinship of intelligence everywhere in sharp contrast to nationalistic barriers."

Concluding his long article Mr. Singer notes that, "To state the common ground of the sciences is to raise the question of their interrelationship. Sessions of the Congress, one the principal general meeting, were given over to a philosophical and methodological discussion of tasks in the unification of science."

Thus "The synthesis which the Unity of Science is preparing is not a fixed straight jacket for the 'liberal' mind; like science itself, it lives and changes, and in this fact alone there is strong hope for its survival and future importance. Science is crucial enough, and the present times grave enough, to make this an excellent starting point if our age is to 'build philosophy' at all. The challenge in this enterprise has been indicated by John Dewey:



'The scientific attitude and method are at bottom but the method of free and effective intelligence. The special sciences reveal what this method is and means, and what it is capable of. It is neither feasible nor desirable that all human beings should become practitioners of a special science. But it is intensely desirable and under certain conditions practicable that all human beings become scientific in their attitudes: genuinely intelligent in their ways of thinking and acting. It is practicable because all normal persons have the potential germs which make this result possible. It is desirable because this attitude forms the sole ultimate alternative to prejudice, dogma, authority, and coercive force exercised in behalf of some special interest. Those who are concerned with science in its more technical meaning are obviously those who should take the lead by co-operation with one another in bringing home to all the inherent universality of scientific method.'

#### THE ADVANCEMENT OF SCIENCE

#### And Mans Potential

In the evolution of science there have been changing environments which have profoundly influenced its progress. The general cultural background printing press, scientific academies, politics, philosophical doctrines, geographical exploration, religion and superstition have hastened or have hindered its advancement. Copernicus exploded the belief in a geocentric universe, Darwin taught us to think in terms of evolution, Pasteur dispelled the ignorance concerning disease, and Fraser suggested that we look for the origin of many beliefs in the beliefs held by primitive people. As in organic evolution, mutations have arisen in science, which persisted or died out in time. Newton and Leibnitz's discovery of the fundamental principles of calculus, the complete break between organic and inorganic chemistry with Wohler's preparation of urea from ammonium cyanate, avogadro's gas laws, Galileo's demonstration that the acceleration of falling bodies is the same, irrespective of mass--all are mutations--things which suddenly appeared and incidentally persisted.

However science does not generally evolve in this manner. Rather its advance is by small continuous variations that may or may not persist. This is the thesis of Dr. E.P. Phillips, Chairman of the Council, Pretoria Tech. College (S.A.), who contends that the origin of science lies in the pre-history of man, and its advancement is a product of the human intellect. Therefore man has the capacity to solve all of his social and economic problems; and they will be solved when the same energy that is expended on physical inventions, is brought to bear on these social and economic problems. (Science 96, 1-3, July 3, 1942)

Here is a running commentary of a French's flyer's feelings during a combat with German planes. "I used often to wonder what a man's last moments were like. I had always assumed that the ordeal, when it came, would concern my flesh and my flesh alone. Like all men I had given my body a good deal of time. I had dressed it, bathed it, quenched its thirst, had taken it to the tailor, surgeon, the barber. I had identified myself with this domesticated animal. I had said of it 'This is me'. And now suddenly my illusion vanished. What was my body to me? A kind of flunkie in my service. Let but my anger wax hot, my love grow exalted, my hatred collect in me, and that boasted solidarity between my body and me was gone. .... each time for a fraction of a second, it seemed to me that my plane had been blown to bits;----I ought to have felt successively the shock, then the fear, then the relief; but there was no time. What I felt was the shock, then instantly the relief. The intermediate step - fear - was missing. .... In the instant when you are giving up your body, you learn to your amazement--all men learn to their amazement--how little store you set by it. .... Man does not die. There is no death when you meet death. When the body sinks into death, the essence of man is revealed. Man is a mesh into which relationships are tied. Only those relationships matter. I have never known a man to think of himself when dying. Never." Excerpts from "Flight to Arras" by Antoine de Saint Exupery, in Reader's Digest 41, 143-8, Aug., 1942)

## RESULTS IN THE BODY

## Of Causes Beyond It

That bodily disharmony has its source at higher levels than the physical is coming to be a rather generally accepted idea. The rapid pace of present civilization (or lack of it) has brought heart trouble to the top of the list as a cause of death. For similar reasons stomach ulcers also seem more in evidence. An article, "Stomach Ulcer - Wound Stripe of Civilization," in Fortune, for December 1941, author unnamed, presents some interesting ideas about this: Until comparatively recently doctors considered peptic ulcer a local disease caused by hyperacidity, poor diet, excessive drinking and smoking. Many medical men still have this opinion, but ulcer is gradually moving out of the realm of the family doctors into that of the psychiatrists. It is currently regarded as a psycho-somatic disorder one in which chronic emotional disturbances lead to organic damage. .... Medical and surgical treatment is generally only incidental to the mental therapy more and more widely applied today. Until the underlying psychic causes of the trouble are remedied, there can be little hope, in the chronic cases, of doing much more than easing the discomfort temporarily. .... Much remains to be discovered. But they seem to have proved that the disordered psyche is the seat of most gastric diseases, and it may well be of others." R.L.R.

## WHY WE DO NOT BEHAVE LIKE APES

According to Dr. Frank Beech, Chairman, Department of Animal Behavior, Am. Museum of Natural History, "Man's progress can be traced to the fact that he inherits very few instincts. He is therefore able to change, whereas the behavior of lower animals is predominantly instinctive and therefore static and stereotyped. .... So far as instinctive behavior is concerned, there is probably very little difference between one race and another. Their instincts are all the same.

Physically there are many differences and many of these are due in a large degree to heredity. Where differences in behavior show up later in life, they are due, not to heredity but to the methods of education. In other words, the



instinctive behavior of all races is inherited and any other differences which appear in the behavior pattern are due to learning processes of the individual concerned. .... The maternal instinct, however, is not universal. Mother love in humans appears to be learned rather than instinctive. .... An animal's behavior is a blend of instinct and learning. The important thing is that in higher animals this blending consists of a little instinct and a lot of learning, whereas in the lower forms it is made up of a lot of instinct and a little learning. .... this constant process of learning keeps man's behavior plastic and subject to improvement through experience. That is the reason we don't behave like other animals." (Science Digest 12,77-80 Oct., 1942 Condensed from a "Science Forum" Program)

#### SOUND AND ULTRASOUND

#### Revealing Research

An apparatus for the production of focused ultrasound has been constructed and applied to biological material. Focal lesions were produced in fresh tissue and living animals. (Science 96: 119-20, July 31, 1942 reporting on The biological application of focused ultrasonic waves, by J. G. Lynn et al, Columbia University.)

Objection to Dr. A.L.Herrera's theory as to the origin of life (See Main Currents, Aug.1942) is voiced by Jerome Alexander who postulates, "self duplication and the ability to direct chemical change by catalysis", as the line of demarkation between living and non-living. "With this criteria accepted, the simplest conceivable living unit would thus be a moleculobiont--a catalyst particle of molecular dimensions capable of autocatalysis (self-reproduction). The ability to undergo heritable changes is generally observed in living units and seems to be a third criterion of life, although we can conceive of units incapable of this basis of evolution. Heritable changes in biocatalysis (demonstrated in the case of genes but probably also with enzymes, carriers and prosthetic groups) underlie changes in chemical output due to syntheses and analyses, which in turn are the basis of changes visible in structure, form, physiology and function. Although the various artifacts (Herrera's and others) may simulate many of the forms and activities of truly living units, none of them yet has been shown to exhibit the criteria of life above outlines." (Science 96,252-3, Sept.11, 1942)

## LIFE

## And Growth

A review of present knowledge of how molecules grow and multiply was given by Kurt G. Stern of the Overly Biochemical Research Foundation, at the annual symposium of the Society for the Study of Growth. From the work of academician W.A. Engelhard and his Moscow colleagues, on the way that muscle fibres use food energy in contraction, Dr. Stern arrived at a conclusion:-

"One of the things that probably happens when virus particles multiply, is a piracy of energy from the same kind of phosphorus compound (adenyl pyrophosphate) in the host cell, by the parasitic virus particles. It is suggested therefore that virus growth depends on the appropriation of the host cell's energy as well as its building material. This would explain, among other things, why viruses are always parasitic, feeding only on living cells of plants and animals, and are never found as scavengers, feeding on the dead. Dead things might yield them building materials, but could offer no substance actively engaged in the transfer of life energy." (Science Supplement 96,12 Sept. 4, 1942)

## DEATH

## And Its Processes

According to some biologists, death of the cell is due to the inactivation of its enzymes. The "logarithmic order of death" of bacteria is believed by some to be the necessary consequence of the "logarithmic order of enzyme coagulation." All experimental evidence at hand indicates that it is possible to kill the cell without destroying the enzymes. A study of the death of cells and of the loss of enzyme activity in bacillus cereus under the action of heat, indicated that previous evidence considered to support the enzyme theory of death involved faulty technic. The monomolecular inactivation of enzymes is said to have nothing to do with the logarithmic order of death. "If there are many enzyme molecules per cell, all the cells would reach the same stage at the same time and not in a logarithmic sequence. If inactivation of only a few molecules causes death, the order will resemble that for higher organisms. The logarithmic order is established only if death is caused by the reaction of one single molecule."

(Inactivation of enzymes as the cause of death in bacteria. O. Rahn and W.R. Schroeder. Cornell Univ. Experiment Station Record, May 1942) G. B.

1. Colchicine, the "evolution chemical" that doubles chromosome numbers in plant cells and produces new and sometimes giant varieties, now has a rival in a compound known as sanguinarin. Thomas M. Little of the U.S. Dept. of Agriculture Exp. Station at Beltsville, Md., has obtained approximately the same percentage of positive results from both colchicine and sanguinarin treated plants. The leaves of plants treated with the latter drug did not have the roughened and wrinkled appearance which follows the use of colchicine in most plants.

Sanguinarin is a drug of plant origin which is obtained from the rootstock of the early spring flower known as bloodroot. It is listed in medical dictionaries as a medicine for coughs and stomach ailments and, in high concentrations, is poisonous. (Science News Letter 42, 172 Sept. 12, 1942)

2. "Chemical magic with plants" is described by two U.S. Dept. of Agriculture plant physiologists, Dr. John W. Mitchell and Ruby R. Rice, in a new Departmental publication "Plant Growth Regulation." This tells how growth promoting substances indole acetic acid and related chemical compounds can be used to insure the rooting of slips and cuttings; to keep trees from dropping their fruit before it is ripe; to make holly berries form from unpollinated flowers; to induce the production of seedless tomatoes, and a number of other useful things that "plants are unlikely to do if left to their own devices."

(Science Supplement 96, 14, Sept. 4, 1942 See also Main Currents, Sept. 1941)

3. In the 51st Annual Report, 1941, 37-9 of the Alabama Agricultural Experiment Station, E.W.M. Elwee reports that cuttings treated with indolebutyric acid showed consistently a higher percentage of rootings and developed larger root systems than cuttings treated with any other hormone. Vitamin B<sub>1</sub>, alone, had little stimulating effect on rooting and in some cases its effect was actually detrimental. Sucrose was almost as effective as indolebutyric acid in stimulating root production. The optimum amount was 0.6 Oz. to a quart of water. (Chemical Abstracts 36, 4543, Aug. 10, 1942)

#### SHOCK ANESTHESIA

In Myxoneycetes

In experiments by W. Seifriz and N. Epstein, reported in Biodynamica 3, M. 67, 1941, it was discovered that when a plasmodium was hit by a falling drop of water or by the stroke of a needle, protoplasmic flow suddenly stopped. This is regarded as a case of anesthesia. The shock anesthesia was accompanied by a thixotropic setting or sudden gelatinization of the protoplasm. Recovery was complete if the cessation of movement from the shock was not accompanied by traumatic injury.

G.B.

#### ELASTICITY OF WOOL.

The basis of the elasticity of wool has been extensively investigated by Research Associates of the Textile Foundation, stationed at the Bureau of Standards, Wash., D.C. According to Milton Harris, Louis R. Mizell and Lyman Fourn, wool owes its elasticity to a rubber like molecular structure, in contrast to most common fibres which resemble bundles of closely packed, extended strings, each string representing a long molecular chain. When these string-like fibres are distorted very much, the long chains move into new positions with respect to each other. Since, in a fibre such as cotton, the new positions are similar to the old, the fibre does not return to its original shape. This is why cotton and similar materials crease so readily. The molecules of wool fibres would also slide past each other and permanent distortion would result, if it were not for the fact that they are connected at intervals by short cross chains, which produce a three dimensional net-work structure. Thus, when wool is stretched or folded, the chains do not slide permanently out of position but tensions are set up which cause the fibre to return to its original shape after removal of the external force. The function of the cross chains in wool is very similar to that of the cross chains which are formed during the vulcanization of rubber. (Bu. Standards Jour. Research 29, 73-85, July, 1942 - Jour. Frank. Inst. 234, 162-3, Aug. 1942)



In the years just before 1937 "the old alchemical dream, of the transmutation of one elementary substance into another," had been achieved and by completely artificial methods. So far its practical application has been mainly in the field of medicine. The artificial transmutation of elements hinges on the previous discovery of isotopes (two or more types of atoms with the same chemical properties but different masses). To effect a permanent transmutation of a substance, the nucleus must be bombarded with small particles moving at extremely high speeds. This is the job of the "atom-smashing" machines. The nucleus of an atom thus disrupted may become spontaneously unstable but it will after a time break down into a more stable form. While so doing it will shoot out of itself a characteristic radiation, behaving in fact, like radium. By this method of transmutation it is possible to manufacture "a number of radio-active elements which are isotopes, that is, have the same chemical properties as many of the common atoms which we usually come across in stable and non-radio active forms."

Living cells are intensely sensitive to radio-active substances. Thus the wide use of radium in the treatment of cancer, which is characterized by the excessive growth of the affected tissue. Radio-active forms of many common elements contained in our every-day articles of diet can now be prepared. Knowing the different chemical requirements of different tissues of the body it is now possible to administer radio-active substances which will affect the organ to be treated without producing noticeable effects on other parts of the body. For instance radio-active iodine may be administered in the treatment of the thyroid gland, which is the greatest storehouse of iodine in the body.

Aside from its simplicity this method has other advantages, as for instance in diseases such as leukemia in which the blood cells multiply too rapidly. The impossibility of applying radium to the bone marrow, where the cells first form, is apparent, but by administering radio-active phosphorous these cells may be treated. With this discovery new light is also being thrown on "some of the basic chemical reactions on which life depends." It has been found that the chemical processes in living cells must be much more rapid and manifold than had previously been thought. The comparison of a living system to a flame is more exact than would have been supposed for "scarcely any part of a living organism stays put...life seems to imply incessant antagonistic activities of decay and renewal, and to be, in fact, merely the result of a lack of perfect balance between these opposing processes." (THE FORTNIGHTLY, May, 1942) G. B.

## FREE ELECTRONS

## Their Function Described

Loose electrons which float around between the atoms of solid iron and its alloys are responsible for many of the properties of these alloys, said Dr. Roman Smoluchowski, speaking recently before the American Physical Society. In iron, as in all metals which are electrical conductors, the atoms are made up of electrons carrying a negative charge, encircling a positively charged nucleus and forming a lattice. But also there are other electrons floating around in the lattice, not connected to any particular atom. The drift of these so called "free electrons" is responsible for the conduction of electricity as well as heat.

The crystal structure of pure iron has the atoms arranged in the form of interlocking cubes, the corners of each cube forming the centers of adjacent cubes. Thus they form the "alpha phase" arrangement, which makes for toughness and strength. However, when the iron is heated to 900°C., it goes to the "gamma phase". Here the atoms are more closely packed and the whole metal contracts slightly. When other metals are alloyed with iron, some increase the range of temperature over which the gamma phase occurs, while others decrease or eliminate it entirely. All the 92 elements can be arranged by their atomic weights in a checkerboard fashion, to form the well known "periodic table". Iron comes close to the middle. It has been found by previous experimenters, said Dr. Smoluchowski,

that all the elements to the right of iron (and which can dissolve in it) increase the range of temperature for the gamma phase, and all those to the left, with few exceptions, decrease this range.

"The elements to the right of iron such as nickel, cobalt, and platinum, have more free electrons per atom than iron, thus they contribute electrons to the iron lattice. In contrast, those on the left including vanadium, chromium, tungsten and molybdenum, take them away." (SCIENTIFIC AMERICAN 98, 166, Oct. 1942)

#### DEUTERON BOMBARDMENT

#### And Color in Crystals

Numerous investigations have been made on the color changes in crystals produced by cathode rays, ultraviolet rays, X-rays and the radiations from radium. J. M. Cork of the University of Michigan has found that similarly induced changes are caused by bombarding crystals in a cyclotron with deuterons. The color changes, unlike those due to X-rays, show little inclination to fade out. But they disappear abruptly if the crystals are heated through a certain critical temperature, varying from 220 to 900°C. Representative of some of the induced colors are, sodium fluoride-light red, sodium chloride-amber to black, sodium iodide-yellow to green, potassium chloride-purple, potassium bromide-deep blue, potassium iodide-green, fluorite-green to amethyst, rose quartz-brown, diamond-inferior amber stones assume a green color equivalent to that of the rare natural gems. It is considered of considerable interest that, "the metastable states produced by the ejection of electrons by the ionizing radiations, can exist at ordinary temperatures indefinitely."

(PHYSICAL REVIEW 62, 81, July 1 and 15, 1942 cf. Main Currents, Nov. 1940; 1941)

Possibly this is related to the treatment of plants with idole-acetic acid and related compounds, in order to produce permanent alterations in them.

#### BLACKOUT

#### Never Perfect

There is always a glow in the night sky to foil a total blackout, Prof. Christian F. Elvey reported at a recent conference on spectroscopy at the University of Chicago. There are two types of auroras he explained. One is the polar type famous as the northern lights, the other a constant non-polar variety. This latter variety, unlike the polar type, is excited by the energy of its own collisions - that is three-way collisions between atoms from 150 to 500 miles above the earth's surface. Four colors are outstanding in this non-polar glow, red and green from oxygen, a yellow glow from sodium and a blue-green from nitrogen. (SCIENCE DIGEST 12, 63, October, 1942)

#### GRAVITATION CONSTANT

#### Amended a Bit

A new determination of the Newtonian constant of Gravitation is reported by Paul R. Heyl. A number of improvements in the previously used apparatus have been made and the final result is

$$G = 6.673 \pm 0.003 \times 10^{-8} \text{ cm.}^3\text{g}^{-1}\text{Sec}^{-2}$$

as compared with the 1930 result of

$$6.670 \pm 0.005 \times 10^{-8}$$

(Bureau of Standards Jour. of Research 29,1-31, July, 1942: Journal Frank. Inst. 234,155, Aug. 1942)